SYNTHESIS AND CHARACTERIZATION OF BISMUTH COPPER TANTALATE TERNARY SYSTEM

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APPROVAL SHEET

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ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF BISMUTH COPPER TANTALATE TERNARY SYSTEM

Bismuth copper tantalate ternary system material was prepared via solid state method at temperature ranging from 900 °C to 1050 °C. A cubic pyrochlore with formula $Bi_3Cu_2Ta_3O_{14}$ (BCT) was successfully synthesized at 950 °C for 6 hours. The phase purity of material is confirmed by X-ray diffraction technique (XRD). The single phase of BCT was successfully formed as all the diffraction peaks were fully indexed based on space group *Fd*3*m* similar to α-$Bi_3Zn_2Ta_3O_{14}$ (BZT) analogue. The single phase of BCT was then further characterized by Fourier Transform Infrared (FT-IR), and the absorption at 552 cm^{-1}, 490 cm^{-1} and at 520 cm^{-1} assigned to Cu-O stretching, Bi-O stretching and Ta-O stretching, respectively. The surface morphology of the material was observed using scanning electron microscope (SEM) and it was found that the grain size of the sample is in the range of 6 µm to 20 µm. It shows large and well-defined grains and closely packed grain together with some pores on the surface. The electrical property of BCT was determined by ac impedance spectroscopy. It was found that at room temperature, the electrical conductivity for measurement at frequency (i) 50 Hz to 1 MHz, (ii) 50 Hz to 5 MHz and (iii) 100 Hz to 5 MHz are 2.9274×10^{-9} S/m, 2.7364×10^{-9} S/m, and 3.7655×10^{-9} S/m, respectively.